

comparison, and the map of the breeding area here given is an adaptation of Louck's map. "The map of the breeding area is," he says, "also a map showing the path of the spring migration, and also, in all probability, the path by which the species has found its way to its present breeding area since the Ice Age." He then compares the distribution of Kirtland's Warbler with that of the Prothonotary, presenting a similar map of its migration records, from about the mouth of the Ohio River northward. He finds that the birds on leaving the Bahamas reach Florida and South Carolina during the latter half of April and early part of May, and assumes that they pass west by way of the Pine Barrens to the Mississippi; they occur in the Mississippi and Ohio drainage basins during May, reaching their breeding grounds in Oscoda and Crawford Counties, Michigan, early in June. He is, however, unable to "understand the South Carolina records." As the extreme east and west records are respectively Toronto and Minneapolis, "it suggests that the breeding area may be extensive." He adds a map showing "lines of glacial drainage or shore lines, to show the relations of those topographic features to bird migration routes." If Kirtland's Warbler was one of the "early species to push north, it is but natural that it should follow such highways, as it is along such valleys and shore lines, at that time, that the vegetation would make its most rapid extension northward." The latter part of the paper is thus suggestive, but adds little in the way of positive information.

Mr. Wood relates in detail his experiences in pursuit of the breeding place of this warbler, his discovery of its haunts, and the long and careful search for its nest, finally rewarded by the discovery of two nests, one of which, found July 8, contained a perfect egg and two young birds about ten days old; the other nest, found July 9, contained five young, also about ten days old. An attempt to rear the young naturally failed. Five adult males and three adult females were taken, in addition to the nests, egg, and seven nestlings. The song and the habits of the birds as observed in their breeding haunts are minutely described, and descriptions and half-tone illustrations are given of the egg and nests, of the sites where the nests were found, and of the mounted group of these birds now in the Museum of the University of Michigan, prepared by Mr. Wood from the materials obtained on this expedition. Although preliminary notices of these discoveries have been published, this paper forms the most important contribution thus far made to the history of the species, which is at last removed from the small list of North American birds whose nests and eggs and breeding habits still remain unknown. — J. A. A.

Forbush on the Destruction of Birds by the Elements.¹ — After some

¹ The Destruction of Birds by the Elements in 1903-04. Special Report. By Edward Howe Forbush, Ornithologist to the State Board of Agriculture. Fifty-first Ann. Rep. Massachusetts State Board of Agriculture, pp. 457-503.

general statements about the destruction of birds by the elements Mr. Forbush gives the results of his investigations in relation to the effect of the remarkable weather of May and June, 1903, upon bird life in Massachusetts and adjoining States. An almost unprecedented drought prevailed from the middle of April till the 6th of June, followed by three weeks of almost unparalleled rainfall, with periods of excessively low temperature. The scarcity of insects due to the drought appears to have been responsible for the starvation of the young of many insectivorous birds, and apparently also of some of the old birds. But the abnormal and severe weather of June proved far more disastrous. The heavy storms blew down many of the nests, with their eggs or young, of the tree-nesting species, while ground- and bush-nesting species had their nests submerged or so drenched with rain as to cause the complete destruction of their contents or their desertion by the parent birds. The inundation of low-lying lands, and the rise of streams and ponds, drowned out or destroyed not only the nests of marsh-breeding birds, but those of blackbirds and sparrows, of various species, at many localities where their nests became submerged, while the cold rains often destroyed the young birds where the nesting-sites were above the reach of the floods, and in many instances the parent birds seem to have succumbed to the inclemency of the weather. While these conditions were fortunately not general throughout the State, they occurred at so many localities that the effect was disastrous to bird life. The swallows and swifts appear to have been the worst sufferers, the old birds, as well as the young, dying at some localities in vast numbers from cold and starvation, owing to the absence of insect food directly caused by the severe weather conditions. The almost complete extinction of whole colonies of Martins, Tree Swallows, Barn Swallows, and Chimney Swifts is recorded from several localities within the storm areas of heaviest precipitation.

The winter following this unfavorable summer—that of 1903-04—proved of almost unequalled severity in New England. January was one of the severest months on record in eastern Massachusetts, both for lowness of temperature and amount of snowfall, and February was almost equally severe. According to Mr. Forbush's observations at Wareham and elsewhere in the State, the birds suffered greatly from the intense cold, and many evidently perished. While, for obvious reasons, not many dead birds were found, there was gradually a great reduction in their numbers at many localities, and it is believed by Mr. Forbush, and by other observers quoted by him, that the birds died, in some cases from the excessive cold, in others from lack of food. Crows, and perhaps certain individuals of other species, appear to have left the colder portions of New England for more southern points.

Mr. Forbush closes his sadly interesting report with some suggestions as to the measures that may be taken for protecting birds and increasing their numbers, especially through providing them with food and shelter during winter, and in checking their illegal slaughter. The author has

expended a great deal of time and labor in bringing together the facts here presented, which he has secured in large part through the issue of circulars to some two hundred correspondents requesting information on the points at issue. — J. A. A.

Judd's 'The Economic Value of the Bobwhite.' — In a paper of about ten pages Dr. Judd¹ treats of the economic value of the Bobwhite (*Colinus virginianus*) as (1) a weed and insect destroyer, (2) an article of food, (3) an object of sport. The food report is based on field observations and an examination of 801 stomachs, collected in every month of the year and over a wide extent of country — from Canada to Florida and Texas. The Bobwhite is found to be preëminently a seed-eater, over fifty per cent of its food consisting of seeds, of which the seeds of weeds constitute the bulk. On a very conservative basis "the total consumption of weed seed by Bobwhites from September 1 to April 30 in Virginia amounts to 573 tons." From May to August nearly one third of the Bobwhite's food is found to be insects, which is made up largely of such injurious species as the potato beetle, cucumber beetle, squash bugs, chinch bugs, cotton-boll weevils, various kinds of destructive caterpillars, grasshoppers, etc. It eats very little grain, and this is mainly gathered from stubble fields, and it never, apparently, destroys sprouting grain, like the Crow, various Blackbirds, etc., nor is it, like the Ruffed Grouse, destructive to any harmful extent to leaves and buds. The importance of the Bobwhite as an article of food, and also as an object of sport, is dwelt upon at some length, and it is pointed out that it is possible for farmers to derive a considerable revenue from sportsmen by promoting its increase for purposes of sport. "It is believed," he says, "that if suitably managed, some farms of from 500 to 1000 acres would yield a better revenue from Bobwhites than from poultry." More stringent and more uniform legal provision is recommended for its preservation and increase. The paper closes with a list of seeds, fruits, insects, etc., eaten by the Bobwhite, and is illustrated by a colored plate, by Fuertes, of a Bobwhite in a potato field catching potato beetles. The utility of the Bobwhite as a weed destroyer is especially emphasized. — J. A. A.

Elrod on Birds in Relation to Agriculture. — In this paper of some twenty pages, illustrated with several plates of representative birds, Professor Elrod² summarizes some of the results of recent investigations of

¹ The Economic Value of the Bobwhite. By Sylvester D. Judd, Ph. D., Assistant in Ornithology. Yearbook of Depart. of Agriculture for 1903, pp. 193-204, pl. xvi.

² The Relation of Birds to Agriculture. By Morton J. Elrod, University of Montana. Second Ann. Rep. Montana State Board of Farmers' Institutes, pp. 173-190, with 8 pll. University of Montana, Missoula, Mont., 1904.